CLASS VI FRACTURE GRADIENT AND OPERATING PRESSURE

INJECTION WELLS 357-7R AND 355-7R

ELK HILLS A1-A2 PROJECT

Fracture Pressure and Fracture Gradient

The Monterey Formation A1-A2 reservoir has been developed with assistance of gas and water injection to maintain reservoir pressure and improve oil recovery efficiency. As part of this process, California Resources Corporation (CRC) obtained Class II UIC approval from CalGEM. The Class II permit approval mandates that the maximum operating pressure gradient should not exceed 0.80 psi/foot unless additional testing indicates a higher gradient is appropriate.

CRC has also conducted tests to determine the fracture gradient for the injection zone. These results are consistent with data collected outside the field. Reservoir fracture gradient and the fracture pressure based on the shallowest Reef Ridge Shale depth in the AoR are shown in Table 1. The fracture gradient is based on a Monterey Formation A1-A2 fracture test in the 327-7R-RD1 well (Table 1).

Table 1: Summary of the fracture pressure data for the Monterey Formation A1-A2 reservoir.

Interval	Fracture Gradient (PSI/foot)	Fracture Pressure (PSI) at base of Reef Ridge Shale (8,403 feet)	90% of Fracture Pressure (PSI)
Monterey Formation A1-A2	0.97	8,150	7,335

Carbon TerraVault 1 LLC will ensure that the injection pressure is beneath 90% of the fracture gradient at the shallowest point of the Reef Ridge Shale base in the AoR (Table 2) using the Monterey Formation A1-A2 fracture gradient. The planned maximum subsurface wellbore injection pressure for the project is 4,500 PSI (Table 2).

Table 2: Injection pressure details.

Injection Pressure Details	**Injection Well 1 357-7R**	**Injection Well 2 355-7R**
Fracture gradient (psi/ft)	0.97	0.97
Maximum injection pressure (90% of fracture pressure) (psi)	7,335	7,335
Elevation corresponding to maximum injection pressure (ft MSL)	8,403	8,403
Elevation at the top of the perforated interval (ft MSL)	8,485	8,462
Calculated maximum injection pressure at the top of the perforated interval (psi)	7,407	7,387
Planned maximum injection pressure / gradient (top of perforations)	4,500 / 0.53	4,500 / 0.53